I. NEW DRAWINGS SATISFY ALL FORMAL REQUIREMENTS

The Office Action objects to the drawings and states that the sensor which detects information relating to a capability of holding the mask is not properly shown. Fig. 1 and the specification have been amended to more clearly identify the sensor 50. See, e.g., the Request for Approval of Drawing Correction, the Letter to the Official Draftsperson and paragraph [0064] in the Appendix. Withdrawal of this objection to the drawings is specifically requested.

II. THE CLAIMS DEFINE PATENTABLE SUBJECT MATTER

A. The Office Action reject claims 1, 6, 8-9 and 13-15 under 35 U.S.C. §102(b) over JP 408124843A to Saeki et al. (hereinafter "Saeki"); and rejects claims 1, 6, 8-9 and 13-15 under 35 U.S.C. §102(b) over U.S. Patent No. 5,900,707 to Wakui. These rejections are respectfully traversed.

Neither Saeki nor Wakui teach or suggest all the features recited in independent claims 1, 8, 9 and 13-15.

Saeki discloses an exposure apparatus (as shown in Fig. 1) including an acceleration sensor 21 for measuring acceleration of a stage holder 4 and an assisting driver 22 for providing a mask stage 2A acceleration nearly equal to the measured acceleration to correct a relative positional misalignment between a mask 2 and a sensitive substrate 3 caused by an inertial force provided to the mask stage 2A when the stage holder is accelerated by a driver 5.

Wakui discloses a scan-projection type exposure apparatus which performs a master-slave control with a wafer stage as the master and the reticle stage as the slave. The master-slave control corrects a target value of a position control system of a rough-motion stage 9 or a reticle stage 4 by using motion-mode errors in a one-to-one correspondence with a

disturbance occurring to the rough-motion stage of the wafer stage due to motion of a fine-motion stage of the wafer stage.

Regarding independent claim 1, neither Saeki nor Wakui teach or suggest controlling the movement of the stage via the actuator based on a range of acceleration of a stage where an offset, in a predetermined plane, of a mask on a stage is not caused by movement of the stage to control movement of the stage. Furthermore, neither Saeki nor Wakui teach or suggest controlling movement of the stage so that the acceleration of the stage becomes within the range of acceleration of the stage as recited in claim 1.

Both Saeki and Wakui fail to teach or suggest all of the features recited in independent claim 8. Specifically they fail to disclose determining a range of acceleration of a stage where an offset, in a predetermined plane, of a mask on a stage is not caused by movement of the stage. Furthermore, they also do not teach or suggest controlling movement of the stage based on the range of acceleration so that the acceleration of the stage becomes within the range of acceleration, as recited in claim 8.

Regarding independent claim 9, neither Saeki nor Wakui teach or suggest determining a range of acceleration of a stage where an offset, in a predetermined plane, of a mask on a stage is not caused by movement of the stage. Furthermore, both are silent about detecting a posture of the mask or the substrate on the stage when the acceleration of the stage becomes out of the range of acceleration, as recited in claim 9.

Neither Saeki nor Wakui disclose determining information showing a relationship between an acceleration of a stage and an offset, in a predetermined plane, of a mask or a substrate on the stage caused due to acceleration or deceleration of the stage, as recited in independent claim 13. They also do not suggest obtaining offset information corresponding to the acceleration of the stage based on the detected information and adjusting a relative

positional relationship between the mask and the substrate based on the obtained offset information, as recited in claim 13.

Regarding independent claim 14, neither Saeki nor Wakui disclose obtaining information relating to an offset, in a predetermined plane, of a mask on a stage caused by movement of the stage based on detected information relating to acceleration of the stage, as recited in claim 14. Furthermore, both Saeki and Wakui fail to teach or suggest adjusting a relative positional relationship between the mask and the substrate based on the obtained information.

The applied references fail to disclose obtaining information relating to an offset, in a predetermined plane, of a mask on a stage caused by movement of the stage based on detected information relating to acceleration of the stage, as recited in independent claim 15. In fact, both are silent about performing at least one of an operation for recovery from exposure error and notification of the exposure error when judging based on the obtained information that the exposure error occurs due to the offset, as recited in claim 15.

For at least the reasons discussed above, Applicants respectfully submit that neither Saeki nor Wakui anticipate the subject matter of independent claims 1, 8, 9 and 13-15. Accordingly, the applied references fail to anticipate the subject matter of claim 6, which depends from claim 1. Accordingly, withdrawal of the rejections under 35 U.S.C. §102(b) is respectfully requested.

B. The Office Action rejects claims 2-7, 9-12 and 16-19 under 35 U.S.C. §103(a) over Saeki or Wakui in view of U.S. Patent No. 5,753,926 to Sato. This rejection is respectfully traversed.

Sato discloses a scan-projection type exposure apparatus including a light quantity sensor 34 which detects reticle side transmission marks 102 formed on a reticle 6 and scan

stage side transmission marks 103 formed on a plate 32 fixedly mounted on a wafer chuck 15.

As discussed above, neither Saeki nor Wakui disclose, teach or suggest every feature recited in independent claims 1 and 2. It is respectfully submitted that Sato fails to make up for the shortcomings of both Saeki and Wakui.

Neither Saeki, Wakui nor Sato teach or suggest initiating detection by a posture detection device when the acceleration checked of a stage becomes out of a range of acceleration of a stage where an offset, in a predetermined plane, of a mask on a stage is not caused by movement on the stage, as recited in independent claim 2.

The applied references fail to disclose determining a range of acceleration of a stage where an offset, in a predetermined plane, of a mask or a substrate on the stage is not caused due to acceleration or deceleration of the stage, as recited in independent claims 8 and 9. Furthermore, the applied references are silent about detecting a posture of the mask or the substrate on the stage when the acceleration of the stage becomes out of the range of acceleration.

None of Saeki, Wakui and Sato teach or suggest a storage device in which offset information showing a relationship between an acceleration of a stage and an offset, in a predetermined plane, of a mask on the stage caused by movement of the stage is stored, as recited in independent claim 12. Furthermore, the applied references fail to teach or suggest retrieving from the storage device offset information corresponding to the acceleration of the stage based on the information detected by the acceleration detection device and adjusting a relative position or relationship below the mask and the substrate based on the retrieved offset information, as recited in claim 12.

Accordingly, the Office Action has not established a prima facie case of obviousness as the applied references fail to teach or suggest all of the subject matter independent

claims 1, 2, 8, 9 and 12. Accordingly, the applied references also fail to render obvious the subject matter of claims 3-7, 10, 11 and 16-19 which depend from claims 1, 2, 8 and 9, respectively. Withdrawal of the rejection under 35 U.S.C. §103(a) is therefore respectfully requested.

III. NEW CLAIMS

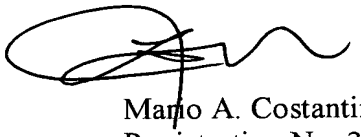
New claims 20-27 variously depend from claims 1, 2, 8 and 9. Therefore, it is respectfully submitted that new claims 20-27 are patentable at least for the reasons discussed above with respect to claims 1, 2, 8 and 9, as well as for the additional features they recite.

IV. CONCLUSION

In view of the foregoing, Applicants respectfully submit that this application is in condition for allowance. Favorable consideration and prompt allowance of claims 1-27 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number set forth below.

Respectfully submitted,



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MAC:RZE/dmw

Attachments:
Appendix
Petition for Extension of Time
Amendment Transmittal
Request for Approval of Drawing Correction
Letter to the Official Draftsperson

Date: March 20, 2003

OLIFF & BERRIDGE, PLC
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Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry;
Charge any fee due to our Deposit Account No. 15-0461

APPENDIX

Changes to Specification:

The following is a marked-up version of the amended paragraph(s) **[0064]**:

[0064] Above, an example of the processing for finding the range of acceleration where offset of the reticle R will not occur when causing the reticle stage 11 to accelerate was explained, but similar processing may be performed to derive by a process of trial and error the range of acceleration where offset of the reticle R will not occur when causing the reticle stage 11 to decelerate. At this time, it is sufficient to find the ranges of acceleration in accordance with the directions of movement (for example, forward direction and reverse direction) of the reticle stage. Further, since the holding force (holding capability) of the reticle by the reticle stage can fluctuate due to changes in the environment or aging, it is possible to find the range of acceleration when for example an environmental condition changes or every predetermined time period. Note that when holding the reticle by electrostatics, the holding capability particularly changes along with the humidity. Further, it is possible to provide a sensor 50 for detecting the holding capability (in the present example, since a reticle is held by suction, a vacuum sensor) and change (correct) the range of acceleration derived first in accordance with the detected holding capability. The processing for deriving the range of acceleration explained above is performed at least at one of the time of startup of the exposure apparatus and the time of exchange of reticles R.

Changes to Claims:

Claims 20-27 are added.

The following is a marked-up version of the amended claims 1-19:

1. (Amended) An exposure apparatus which exposes ~~for exposing~~ a substrate through a mask formed with a pattern,

——————said exposure apparatus comprising:

a stage which holds ~~and moves~~ said mask and is moved by an actuator to move said mask in a direction on a predetermined plane substantially parallel to a pattern surface of said mask~~,~~;

an acceleration detection device which detects information relating to acceleration of the stage~~,~~; and

a control device which controls movement of said stage via said actuator based on a range of acceleration of said stage where an offset, in said predetermined plane, of said mask on said stage is not caused by movement of said stage so that the acceleration of said stage as based on the information detected by said acceleration detection device becomes within the ~~a~~ range of acceleration of said stage ~~found in advance where offset will not occur in the mask~~.

2. (Amended) An exposure apparatus ~~for exposing~~which exposes a substrate through a mask formed with a pattern,

——————said exposure apparatus comprising:

a stage which holds ~~and moves~~ said mask and is moved by an actuator to move said mask in a direction on a predetermined plane substantially parallel to a pattern surface of said mask~~,~~;

an acceleration detection device which detects information relating to acceleration of said stage~~,~~;

a posture detection device which detects a posture of said mask on said stage~~,~~; and

a control device which checks the acceleration of said stage based on the information detected by said acceleration detection device and which initiates detection by said posture detection device when the acceleration of said stage ~~as based on the information detected by said acceleration detection device~~ becomes out of the range of acceleration of

said stage where an offset, in said predetermined plane, of said mask on said stage is not caused by movement of said stage~~found in advance where offset will not occur in the mask and performs processing for notifying an operator of the fact that it has judged and that offset has occurred in said mask when that is the case~~.

3. (Amended) An exposure apparatus according to ~~as set forth in~~ claim 2, which ~~is~~ further comprisinges a posture adjustment device which adjusts the relative positional relationship between the mask on the stage and the substrate, and

adjusts the relative positional relationship of the mask and substrate so as to cancel out offset by said posture adjustment device when said control device judges that offset has occurred in the mask.

4. (Twice Amended) An exposure apparatus according to ~~as set forth in~~ claim 1, which derives the range of acceleration by a process of trial and error by repeatedly detecting offset of said mask while increasing or decreasing the acceleration of the stage in steps.

5. (Amended) An exposure apparatus according to ~~as set forth in~~ claim 4, wherein the range of acceleration is derived at least at one of ~~the~~a time of startup of said exposure apparatus and ~~the~~a time of exchange of said mask.

6. (Twice Amended) An exposure apparatus according to ~~as set forth in~~ claim 1, further comprising a storage device which stores the range of acceleration of said stage.

7. (Twice Amended) An exposure apparatus according to ~~as set forth in~~ claim 1, wherein:

said apparatus ~~is~~ further comprisinges a sensor which detects information relating to a capability of said stage to hold said mask; and

said control device changes said range of acceleration in accordance with said information.

8. (Amended) An exposure method for exposing a substrate through a mask formed with a pattern,

~~said exposure method comprising:~~

holding said mask or said substrate by a stage moved via an actuator to move said mask or said substrate in a direction on a predetermined plane substantially parallel to a surface thereof;

determining ~~finding in advance~~ a range of acceleration of said ~~a~~ stage ~~holding and moving said mask or said substrate~~ where an offset, in said predetermined plane, of said mask or said substrate on said stage is not ~~will not be~~ caused ~~in said mask or said substrate~~ due to acceleration or deceleration of the stage; and

performing exposure while controlling the movement of said stage via said actuator based on the range of acceleration so that the acceleration of said stage becomes within the range of acceleration.

9. (Amended) An exposure method for exposing a substrate through a mask formed with a pattern,

~~said exposure method comprising:~~

holding said mask or said substrate by a stage moved via an actuator to move said mask or said substrate in a direction on a predetermined plane substantially parallel to a surface thereof;

determining ~~finding in advance~~ a range of acceleration of said ~~a~~ stage ~~holding and moving said mask or said substrate~~ where an offset, in said predetermined plane, of said mask or said substrate on said stage is not ~~will not be~~ caused ~~in said mask or said substrate~~ due to acceleration or deceleration of the stage~~,~~;

detecting information relating to acceleration of said stage; and

detecting a posture ~~the presence of offset~~ of said mask or said substrate on said stage when the acceleration of said stage as based on said detected information becomes out ~~is outside~~ of the range of acceleration~~, and~~

~~adjusting the relative positional relationship between said mask and said substrate so as to cancel out offset when judging that offset has occurred in said mask or said substrate~~.

10. (Amended) An exposure method according to ~~as set forth in~~ claim 9, further comprising performing processing to notify an operator when judging that the offset has occurred in the mask or substrate.

11. (Twice Amended) An exposure method according to ~~as set forth in~~ claim 8, further comprising:

detecting information relating to the capability of the stage to hold the mask; and

changing the range of acceleration in accordance with the information.

12. (Amended) An exposure apparatus which exposes ~~for exposing~~ a substrate through a mask formed with a pattern,

said exposure apparatus comprising:

a stage which holds ~~and moves~~ said mask and is moved by an actuator to move said mask in a direction on a predetermined plane substantially parallel to a pattern surface of said mask~~,~~;

an acceleration detection device which detects information relating to acceleration of said stage~~,~~;

a posture adjustment device which adjusts a relative positional relationship between said mask and said substrate~~,~~;

a storage device in which offset information showing the relationship between the acceleration of the stage and an ~~the~~ offset, in said predetermined plane, of the mask on the stage caused by movement of said stage ~~found in advance~~ is stored~~,~~; and

a control device which retrieves from said storage device the offset information corresponding to the acceleration of the stage based on the information detected by said acceleration detection device and adjusts a ~~adjusting the~~ relative positional relationship between ~~of~~ said mask and said substrate based on the retrieved offset information ~~so as to cancel out the offset~~ by said posture adjustment device so as to compensate the offset of the mask on the stage.

13. (Amended) An exposure method for exposing a substrate through a mask formed with a pattern,

~~said exposure method comprising: performing exposure by~~

holding said mask or said substrate by a stage moved via an actuator to move said mask or said substrate in a direction on a predetermined plane substantially parallel to a surface thereof;

determining ~~finding in advance~~ information showing the relationship between the acceleration of said stage and an offset, in said predetermined plane, of ~~occurring in~~ said mask or said substrate on the stage caused due to acceleration or deceleration of said ~~a~~ stage; ~~for holding and moving said mask or said substrate in relation with said acceleration~~ and

detecting information relating to acceleration of said stage to obtain offset information corresponding to the acceleration of said stage based on the determined information and the detected information and adjusting a relative positional relationship between said mask and said substrate ~~so as to cancel out the offset~~ based on the obtained offset information so as to compensate the offset of said mask or said substrate~~corresponding to the acceleration of said stage as based on the information~~.

14. (Amended) An exposure apparatus which exposes ~~for exposing~~ a substrate through a mask formed with a pattern,

——————said exposure apparatus comprising:

a stage which holds said mask and is moved by an actuator to move said mask in a direction on a predetermined plane substantially parallel to a pattern surface of said mask~~,~~;

a detection device which detects information relating to acceleration of said stage~~,~~; and

an adjustment device which obtains information relating to an offset, in said predetermined plane, of said mask on said stage caused by movement of said stage based on the detected information and which adjusts a relative positional relationship between said mask and said substrate based on the obtained information so as to compensate the offset of said mask on said stage~~at the time of exposure in accordance with said information~~.

15. (Amended) An exposure apparatus which exposes ~~for exposing~~ a substrate through a mask formed with a pattern,

——————said exposure apparatus comprising:

a stage which holds said mask and is moved by an actuator to move said mask in a direction on a predetermined plane substantially parallel to a pattern surface of said mask~~,~~;

a detection device which detects information relating to acceleration of said stage~~,~~; and

a control device which obtains information relating to an offset, in said predetermined plane, of said mask on said stage caused by movement of said stage based on the detected information and which performs at least one of an operation for recovery from exposure error ~~occurring due to said offset due to movement of said stage~~ and notification of

said exposure error when judging based on the obtained information, that said exposure error occurs due to said offset.

16. (Amended) An exposure apparatus according to ~~as set forth in~~ claim 2, which derives the range of acceleration by a process of trial and error by repeatedly detecting the offset of said mask while increasing or decreasing the acceleration of the stage in steps.

17. (Amended) An exposure apparatus according to ~~as set forth in~~ claim 2, further comprising a storage device which stores the range of acceleration of said stage.

18. (Amended) An exposure apparatus according to ~~as set forth in~~ claim 2, wherein:

said apparatus ~~is~~ further comprisinges a sensor which detects information relating to a capability of said stage to hold said mask; and

said control device changes said range of acceleration in accordance with said information.

19. (Amended) An exposure method according to ~~as set forth in~~ claim 9, further comprising:

detecting information relating to the capability of the stage to hold the mask; and

changing the range of acceleration in accordance with the information.